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(21) International Application Number: PCT/GB96/03092 (22) International Filing Date: 13 December 1996 (13.12.96) (30) Priority Data: 9525414.0 13 December 1995 (13.12.95) GB (71) Applicant (for all designated States except US): ROCEP LUSOL HOLDINGS LIMITED [GB/GB]; Rocep Business Park, Kings Inch Road, Deanpark, Renfrew PA4 8XY (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): FRUTIN, Bernard, Derek [GB/GB]; Jaapston, By Uplawmoor, Renfrewshire GT8 3B6 (GB). (74) Agent: McCALLUM, Graeme, David; Murgitroyd & Company, 373 Scotland Street, Glasgow G5 8QA (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: A DEVICE FOR RELEASING A FLUID INTO A LIQUID IN A CONTAINER (57) Abstract <p>A device (5) for releasing a fluid (6) into a liquid (2) in a container (1) includes a housing (7). At least a portion of the housing (7) is adapted to be inserted into an opening (3) in the container (1). The portion of the housing (7) has a fluid outlet (17). A puncturing device (18) is mounted on the housing (7) and a fluid chamber (11) is movably mounted on the housing (7) for movement between a storage position, in which fluid (6) is retained within the fluid chamber (11), and a release position in which the fluid chamber (11) is punctured by the puncturing device (18) and the fluid (6) is released from the fluid chamber (11) to exit from the device through the fluid outlet (17).</p> <div data-bbox="958 1134 1364 1911"> </div>		

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1 "A Device for Releasing a Fluid into a Liquid in a
2 Container"

3
4 The invention relates to a device for releasing a fluid
5 into a first liquid in a container.

6
7 In a number of applications, such as mixtures of
8 different liquids, it may be necessary to release and
9 mix a liquid into another liquid shortly before the
10 liquid mixture is used. It may not be possible or
11 desirable to store the liquids in a premixed form, as
12 they may react undesirably with each other when stored
13 as the mixture for a period of time. An example of
14 this may be mixtures of alcoholic drinks and non-
15 alcoholic drinks. However, it can also apply to other
16 liquids or to mixtures of liquids and gases.

17
18 In accordance with a first aspect of the present
19 invention, a device for releasing a fluid into a liquid
20 in a container comprises a housing, at least a portion
21 of which is adapted to be inserted into an opening in
22 the container and the portion having a fluid outlet
23 therein; a puncturing device mounted on the housing; a
24 fluid chamber movably mounted on the housing for
25 movement between a storage position, in which fluid is

1 retained within the fluid chamber, and a release
2 position, in which the fluid chamber is punctured by
3 the puncturing device and fluid is released from the
4 fluid chamber to exit from the device through the fluid
5 outlet.

6
7 In accordance with a second aspect of the present
8 invention, a container of a liquid comprises an opening
9 closed by a releasable closure and a device for
10 releasing a fluid into the liquid in the container, the
11 device being mounted in the container adjacent the
12 opening, and the device being in accordance with the
13 first aspect of the invention.

14
15 An advantage of the invention is that by having a fluid
16 chamber which releases fluid when it is punctured it is
17 possible to delay puncturing the fluid chamber until
18 the fluid is to be released into the liquid in the
19 container, just before the liquid is to be used.

20
21 The housing may include a conduit into which the fluid
22 passes after passing through the fluid outlet and the
23 conduit extends below the surface of the liquid in the
24 container. Typically, the conduit extends to at least
25 adjacent the mid-section of the first liquid in the
26 first container and preferably, extends to adjacent the
27 bottom of the first container.

28
29 Alternatively, the fluid may be released onto the
30 surface of the liquid in the container by the device.

31
32 Typically, the fluid chamber may contain a liquid
33 and/or a gas. Preferably, the fluid in the chamber is
34 pressurised prior to puncturing of the chamber.
35 Pressurisation of the fluid would aid expulsion of the
36 fluid from the fluid chamber on release of the closure.

1 Preferably, the fluid chamber includes a rupturable
2 member which is punctured by the puncturing device to
3 release the fluid from the fluid chamber. Typically,
4 the rupturable member may be a membrane.

5
6 In a first example, the fluid chamber may be manually
7 movable to the release position. In a second example,
8 the device could be located inside the container and
9 the fluid chamber moves to the release position on
10 opening of the container.

11
12 An advantage of the manually operable fluid chamber is
13 that a user can choose whether to introduce the fluid
14 into the liquid in the container, if addition of the
15 fluid is optional to use of the liquid.

16
17 In the second example, the housing may comprise two
18 portions, a pressurisable portion and the portion
19 having the fluid outlet, and a valve device may be
20 fitted to permit the pressure within the pressurisable
21 portion to equalise with the pressure within the
22 container, the valve device substantially preventing
23 release of pressure from the pressurisable portion when
24 the releasable closure is removed to open the
25 container.

26
27 The advantage of this feature is that when the pressure
28 within the container is greater than ambient pressure
29 or atmospheric pressure when the container is closed,
30 the pressurisable portion will equalise to the same
31 pressure as the container. When the container is
32 opened a pressure differential will be created between
33 the container and the pressurisable portion because
34 pressure is not released from the pressurisable
35 portion, and the pressure differential can be used to
36 move the fluid chamber to the release position. The

1 valve device may be a semi-permeable membrane which
2 permits gas into the pressurisable portion of housing
3 but is not sufficiently permeable to permit the gas to
4 escape from the pressurisable portion when the
5 container is opened and before the fluid chamber moves
6 to the release position. Alternatively, the valve
7 device may be a one-way valve.

8
9 Preferably, the pressurisable portion may be sealed
10 from the portion having the fluid outlet by the fluid
11 chamber which co-operates with the housing to effect a
12 seal between the fluid chamber and the housing. A
13 sealing device may be located on one or both of the
14 fluid chambers and the housing to help effect the seal.

15
16 Preferably, the fluid and the liquid may be any
17 combination. Examples of combinations are the fluid
18 being lime juice and the liquid being lager, or the
19 fluid being chocolate flavouring and gas and the liquid
20 being milk. The first combination would give the user
21 a lager and lime drink, the second combination would
22 give a chocolate milk shake with the gas helping to
23 generate the froth on the shake.

24
25 Examples of a device for releasing a fluid into a
26 liquid in a container in accordance with the invention
27 will now be described with reference to the
28 accompanying drawings, in which:-

29
30 Fig. 1 is a cross-sectional view through an upper
31 portion of a container with a first example of a
32 device for releasing a fluid into a liquid in the
33 container with the device in a first position in
34 the container;
35 Fig. 2 is a cross-sectional view through the
36 container of Fig. 1 showing the device mounted in

1 the container and the closure of the container
2 removed;
3 Fig. 3 is a cross-sectional view of the container
4 of Fig. 1 with the device in a release position;
5 Fig. 4 is a cross-sectional view of the container
6 of Fig. 1 with the device removed from the
7 container;
8 Fig. 5 is a cross-sectional view through a
9 container showing a second example of a device for
10 releasing fluid into a liquid in the container
11 with the device in a first position;
12 Fig. 6 is a cross-sectional view through the
13 container of Fig. 5 with the closure removed;
14 Fig. 7 is a cross-sectional view through the
15 container of Fig. 5 with the device in a release
16 position;
17 Fig. 8 is a cross-sectional view through the
18 container of Fig. 5 showing the device being
19 removed from the container;
20 Fig. 9 is a cross-sectional view through an upper
21 portion of a container, showing a third example of
22 a device for releasing fluid into liquid in the
23 container with the device in a first position;
24 Fig. 10 is a cross-sectional view of the container
25 shown in Fig. 9, with the closure of the container
26 removed and the device in a second position;
27 Fig. 11 is a cross-sectional view of the container
28 of Fig. 9, with the device in a release position;
29 Fig. 12 is a cross-sectional view of the container
30 of Fig. 9 showing the device being removed from
31 the container;
32 Fig. 13 is a cross-sectional view through an upper
33 portion of a container showing a fourth example of
34 a device for releasing fluid into liquid in the
35 container;
36 Fig. 14 is a cross-sectional view through an upper

1 portion of a container showing a fifth example of
2 a device for releasing fluid into liquid in the
3 container;
4 Fig. 15 is a cross-sectional view through an upper
5 portion of a container showing a sixth example of
6 a device for releasing fluid into liquid in the
7 container;
8 Fig. 16 is a cross-sectional view through a
9 seventh example of a device for releasing fluid
10 into liquid in a container with a fluid chamber in
11 a first position;
12 Fig. 17 is a cross-sectional view through the
13 device of Fig. 16 showing the fluid chamber in an
14 intermediate release position; and,
15 Fig. 18 is a cross-sectional view through the
16 device of Figs. 16 and 17 showing the fluid
17 chamber in a final release position.

18
19 Fig. 1 shows an upper portion of a container 1 which
20 has a liquid 2 within it. The container 1 also has a
21 threaded opening 3 on which a closure 4 is located.
22 Located within the threaded opening 3 is a device 5 for
23 releasing a fluid 6 into the liquid 2 in the container
24 1.

25
26 The device 5 comprises an outer housing 7 which has
27 spaced apart spurs 8, 9 between which a head 10 of a
28 fluid chamber 11 is located. The head 10 has an
29 opening 12 which is sealed by a foil cap 13. The
30 opposite end of the fluid chamber 11 has a vent hole 14
31 which is sealed in the position shown in Fig. 1 by a
32 seal 15 located on the inside of the closure 4.

33
34 The housing 7 has a lip section 16 which rests on the
35 upper end of the threaded opening 3 and is held in
36 position by the closure 4, as shown in Fig. 1. The

1 lower end of the housing 7 has a fluid outlet 17 which
2 passes through the centre of a rupturing portion 18
3 which points upwards towards the foil cap 13 covering
4 the opening 12 of the fluid chamber 11.

5
6 The position shown in Fig. 1, is the position in which
7 the device 5 would be located when the container 1 is
8 retailed or stored.

9
10 When a user wishes to use the contents of the container
11 1, the closure 4 is removed, as shown in Fig. 2, which
12 also removes the seal 15 from the vent hole 14. A user
13 then presses upper end 19 of the chamber 11 downwards,
14 as indicated by arrow 20 in Fig. 3. This causes the
15 head 10 to deflect the spurs 8 and spiked portion 18 of
16 the housing 7 ruptures the foil cap 13. The fluid 6
17 within the fluid chamber 11 exits the chamber and the
18 housing 7 through the fluid outlet 17 in the spike 18
19 thereby releasing the fluid 6 on to the surface of the
20 liquid 2 in the container 1. The fluid 6 empties from
21 the chamber 11 because air can enter the chamber 11
22 simultaneously through the vent hole 4.

23
24 The combination of the liquid 2 and the liquid 6 forms
25 a mixed liquid 21 in the container 1. The device 5 may
26 then be removed from the opening 3 (see Fig. 4) by a
27 user grasping nibs 22 on the upper end of the chamber
28 11 to remove the device from the container 1. The
29 housing 7 is removed from the container 1
30 simultaneously with the chamber 11 because the chamber
31 11 is locked to the housing 7 by spurs 8 which engage
32 behind head 10 on the chamber 11.

33
34 A second example of a device for releasing fluid into a
35 liquid 2 in a container 1, is shown in Figs. 5 to 8.
36 The device 24 is similar to the device 5 shown in Figs.

1 1 to 4, except that the device 24 includes a chamber 23
2 which does not have a vent hole 14 and has a sealing
3 gasket 25 at opening 26, which is sealed by a foil
4 membrane 27. In addition, the chamber 23 contains a
5 liquid 28 and a pressurised gas 56.

6
7 Also, the lower section of housing 7 is modified in
8 that it has a rupturing portion 29 and a connector
9 section 30 depending therefrom. The connector section
10 30 is connected to a dip tube 31. A fluid outlet 32
11 extends through the rupturing portion 29 and
12 communicates with the inside of the dip tube 31.

13
14 In use, the position of the device 24, as shown in Fig.
15 5 is the position in which the container 1 would be
16 retailed or stored.

17
18 When a user wishes to use the contents of the container
19 1, the closure 4 is removed (see Fig. 6) and end 24 of
20 the container 23 is pushed downwards to move the
21 chamber 23 towards the rupturing portion 29 causing the
22 rupture portion 29 to rupture the foil closure 27 (see
23 Fig. 7). When this occurs, the liquid 28 is expelled
24 from the chamber 23, by the pressure of the gas 56,
25 through the outlet 32 and into the liquid 2 in the
26 container 1, via the dip tube 31. The liquid 28 mixes
27 with the liquid 2 to form a mixed liquid 59 in the
28 container 1.

29
30 The device 24 may then be removed from the container 1,
31 as with device 5, by grasping nibs 22 on the upper end
32 of the chamber 23 and pulling upwards. Removal of the
33 device 24, also removes dip tube 31 from the container
34 1.

35
36 Fig. 9 shows a third example of a device 54 for

1 releasing a fluid 58 into a liquid in a container 1.
2 The device 54 comprises a housing 57 which has spurs
3 33, 34 which hold a head 35 of a fluid chamber 36. The
4 chamber 36 has a sealing gasket 37 which defines an
5 opening 38 which is closed by a foil membrane and
6 plastic seal 39. The opposite end of the chamber 36
7 has a hole which is covered by a membrane 40. The
8 lower portion of the housing 57 has a rupture portion
9 41 with a fluid passageway 42 therein. Depending from
10 the rupture portion 41 is a connector 43 to which a dip
11 tube 44 is attached. Hence, the fluid passageway 42
12 communicates with the interior of the dip tube 44.

13
14 The upper section of the housing 32 has a telescopic
15 section 45 in which is located a plunger 46. Bleed
16 holes 47 in the housing 57 and the telescopic section
17 45 permit gas to bleed into void 48 between the plunger
18 46 and the upper end of the fluid chamber 36 from air
19 space 49 in the container 1. In addition, an optional
20 spring 50 may be located between the upper end of the
21 chamber 36 and the inside of the plunger 46 (see Fig.
22 10). The spring 50 is optional and is preferably used
23 where the liquid in the container 1 is a still liquid.
24 However, the spring 50 may also be used where the
25 liquid is aerated or naturally produces a gas.

26
27 In use, the device 54 is located in the container 1 in
28 the neck 3 and is secured in position by a threaded cap
29 51 which also seals the container 1. The cap 51
30 threadedly attaches to the opening 3, as shown in Fig.
31 9. The position of the device shown in Fig. 9 is the
32 position in which the container 1 would be retailed or
33 stored.

34
35 When a user wishes to use a liquid within a container
36 1, the threaded cap 51 is removed and either pressure

1 of the spring 50 and/or the pressure of gas in the void
2 48, which has entered the void 48 through the bleed
3 holes 47, forces the telescopic section 45 upwards to
4 the position shown in Fig. 10.

5
6 When the device 54 reaches the position shown in Fig.
7 10, a user may press the plunger 46 downwards in the
8 direction of the arrow 52. This causes the telescopic
9 section 45 to move downwards, forcing the chamber 36
10 downwards by spurs 53 which are engaged against the
11 upper end of the chamber 36. As the chamber 36 is
12 forced downwards within the housing 54, the rupture
13 portion 41 ruptures the foil membrane 39 which releases
14 fluid 58 through the fluid outlet 42 into the dip tube
15 44. The fluid 58 is either pressurised on insertion of
16 the fluid 58 into the chamber 36, or else gas from the
17 void 49 in the container 1 has pressurised the fluid 32
18 by entering the chamber 36 through bleed holes 37, void
19 48 and the semi-permeable membrane 40. The pressurised
20 fluid 58 is expelled from the chamber 36 through the
21 dip tube 44 into the liquid in the container 1 by this
22 pressure.

23
24 After the fluid 58 has been expelled from the chamber
25 36, the device 54 may be removed from the container 1
26 (see Fig. 12) by a user grasping nibs 55 on the top end
27 of the telescopic section 45.

28
29 A fourth example of a device 60 for introducing a
30 liquid 61 into liquid 2 in the container 1 is shown in
31 Fig. 13. Device 60 is similar to the device 24, except
32 that the device 60 has a chamber 62 which incorporates
33 a one-way valve 63 which permits gas from air space 49
34 in the container 1 to enter chamber 62 and pressurise
35 the liquid 61. Apart from this modification, the
36 chamber 62 is identical to the chamber 23 of device 24

1 shown in Figs. 5 to 8. In use, the device 60 operates
2 in a similar manner to the device 24 and it is gas
3 which enters chamber 62 during storage via the one-way
4 valve 63 which expels the liquid 61 from the chamber 62
5 through outlet 32 into the dip tube 31 to enter liquid
6 64 in the container 1.

7
8 Fig. 14 shows a fifth example of a device 65 for
9 releasing fluid 66 into a liquid in the container 1.
10 The device 65 is similar to the device 54 shown in
11 Figs. 9 to 12, except that the device 65 does not have
12 a membrane 40 on its upper end and contains no holes in
13 its upper end. In the device 65, the liquid 66 is
14 pressurised when it is inserted into chamber 67 and
15 before the chamber 67 is sealed.

16
17 However, the device 65 operates in a similar manner to
18 the device 54 and could use an optional spring 50
19 located between the upper end of the chamber 67 and the
20 inside of the plunger 46.

21
22 A sixth example of the device 68 for releasing fluid 69
23 into liquid in a container 1 is shown in Fig. 15. The
24 device 68 is similar to the device 54 shown in Figs. 9
25 to 12, except that chamber 70 does not have a seal
26 gasket 39 and only has an opening 71 sealed by a foil
27 membrane 72. In addition, housing 73 of the device 68
28 is identical to housing 57, except that it has a
29 slightly modified rupture portion 74 and no connector
30 43 or dip tube 44. Hence, fluid outlet 75 permits
31 fluid 69 to be expelled from the chamber 70 directly
32 onto the surface of the liquid in the container 1, when
33 chamber 70 is urged downwards so that the rupturing
34 portion 74 ruptures the foil membrane 72. Operation of
35 the device 68 is similar to the device 54 shown in
36 Figs. 9 to 12 and if desired, an optional spring 50 can

1 be fitted between the top of the chamber 70 and the
2 inside of plunger 46 to aid lifting of the telescopic
3 section 45 and plunger 46 when the threaded cap 51 is
4 removed from the container 1.

5
6 A seventh example of a device 80 for releasing a fluid
7 81 into a liquid in a container (not shown) is shown in
8 Fig. 16. The device 80 comprises a housing 82 which
9 has an upper section 83 and a lower section 84.
10 Attached to the upper section 83 is a cap 85 which has
11 a number of ridges 86 on its top surface. In addition,
12 there is a vent hole 87 in the cap 85 and the hole 87
13 is covered by a semi-permeable membrane 88. Located
14 within the housing 82 is a fluid chamber 89 in which
15 the liquid 81 is contained. The fluid chamber 89 has
16 an open end 90 which is sealed by an annular gasket 91
17 and a central aperture 92 of the gasket 91 is sealed by
18 a foil membrane 93. A protective cap 94 covers the
19 gasket 91 and the cap 94 has a central aperture therein
20 which coincides with the aperture 92 in the gasket 91.
21 The cap 94 is snapped over open end 90 of the fluid
22 chamber 89 and the cap 94 terminates in sprung legs 95
23 at the side of the fluid chamber 89.

24
25 The lower portion 84 of housing 82 has a central
26 rupturing portion 96 in which grooves 97 are formed.
27 The lower portion 84 of the housing 82 is formed by
28 arms 98 which extend from upper portion 83 downwards
29 and then radially inwards to join the rupturing portion
30 96 and there are gaps between the arms 98.

31
32 In use, the device 80 may for example be filled with a
33 liquid which is super-saturated with nitrogen. The
34 device 80 may then be attached to the underside of the
35 cap of a drink can, in which the ring pull of the drink
36 can is located. The device 80 may be attached to the

1 underside of the cap of the drink can by adhesive which
2 attaches ribs 86 to the underside of the drink can.
3 The ridges 86 are not continuous thus permitting gas
4 within the drink can to pass from the drink can, after
5 it is sealed, through membrane 88 and vent hole 87 into
6 air gap 99 between the top of the chamber 89 and the
7 underside of the cap 85.

8
9 Typically, the drink can may be a can for beer or
10 another drink in which the contents of the can are
11 pressurised.

12
13 When a user opens the can by pulling the ring pull, the
14 pressure within the can will drop to atmospheric
15 pressure. However, the membrane 88 prevents immediate
16 equalisation of the pressure between the air gap 99 and
17 the rest of the can and therefore prevents the pressure
18 in the air gap 99 falling to atmospheric pressure.
19 This pressure differential acts against the upper end
20 of the chamber 89 which forces the chamber 89 downwards
21 and against the rupturing portion 96 which ruptures the
22 foil membrane closure 93. The chamber 89 is then in
23 the position shown in Fig. 17 in which the rupturing
24 portion 96 has pierced the membrane 93. Fluid 81 in
25 the chamber 89, which is pressurised, is then expelled
26 through grooves 97 in the rupturing member 96 and out
27 of the housing 82 via the gaps in the arms 98 in the
28 lower section 84 of the housing 82, and into contact
29 with the liquid in the can. As the excess pressure in
30 the air gap 99 bleeds through the vent hole 87 and
31 membrane 88, the pressure on the upper end of the
32 chamber 89 reduces to atmospheric pressure and the
33 chamber 89 relaxes to the position shown in Fig. 18.

34
35 When the rupturing member 96 ruptures the foil membrane
36 93, spring arms 95 are already engaged below lugs 100

1 which prevents the pressure within the chamber 89
2 pushing the chamber 89 back upwards to the position
3 shown in Fig. 16.

4
5 An advantage of the device 80 shown in Figs. 16 to 18
6 is that the fluid 81 within the chamber 89 can be
7 released into the contents of the liquid in the
8 container, for example a drink can or a bottle, without
9 requiring a user to activate the device 80.

10

11 However, in certain instances devices 5, 24, 54, 60, 65
12 or 68 may be more desirable as this would give a user
13 the option of whether or not to release the fluid
14 within the fluid chamber into contact with the liquid
15 in the container. A user may then decide, if they
16 wish, not to mix the fluid with the liquid if use of
17 the fluid is optional.

18

19 A further advantage of the invention is that the fluid
20 chamber is only punctured or ruptured, when the fluid
21 needs to be released into the liquid in the container.

22

23 The use of a dip tube, such as dip tubes 31 on the
24 devices 24 and 60 and the dip tube 44 on devices 54 and
25 65, permit the fluid to be introduced into the body of
26 the liquid, rather than the surface. This has the
27 advantage that gas in the fluid may be used, for
28 example, to froth the liquid or generate a head on the
29 mixed liquid. An example of such a mixed liquid may be
30 a flavoured milkshake, in which case the fluid may be a
31 mixture of a flavour concentrate and a gas.

32

33 A further advantage of the invention is that the
34 devices can be used with containers which are
35 pressurised or non-pressurised and with fluid which may
36 be a liquid, gas or a liquid/gas mixture.

- 1 Modifications and improvements may be incorporated
- 2 without departing from the scope of the invention.

1 CLAIMS

2

3 1. A device for releasing a fluid into a liquid in a
4 container comprising a housing, at least a portion of
5 which is adapted to be inserted into an opening in the
6 container and the portion having a fluid outlet
7 therein; a puncturing device mounted on the housing; a
8 fluid chamber movably mounted on the housing for
9 movement between a storage position, in which fluid is
10 retained within the fluid chamber, and a release
11 position, in which the fluid chamber is punctured by
12 the puncturing device and fluid is released from the
13 fluid chamber to exit from the device through the fluid
14 outlet.

15

16 2. A device according to claim 1, wherein the housing
17 includes a conduit into which the fluid passes after
18 passing through the fluid outlet.

19

20 3. A device according to claim 1 or claim 2, wherein
21 the fluid in the chamber is pressurised prior to
22 puncturing of the chamber.

23

24 4. A device according to any of the preceding claims,
25 wherein the fluid container contains a liquid and/or a
26 gas.

27

28 5. A device according to any of the preceding claims,
29 wherein the fluid chamber includes a rupturable member
30 which is punctured by the puncturing device to release
31 the fluid from the fluid chamber.

32

33 6. A device according to claim 5, wherein the
34 rupturable member comprises a membrane.

35

36 7. A container of a liquid comprises an opening

1 closed by a releasable closure and a device according
2 to any of the preceding claims, the device releasing a
3 fluid into the liquid in the container, and the device
4 being mounted in the container adjacent the opening.

5

6 8. A container according to claim 7 when dependant on
7 claim 2, wherein the conduit extends below the surface
8 of the liquid in the container.

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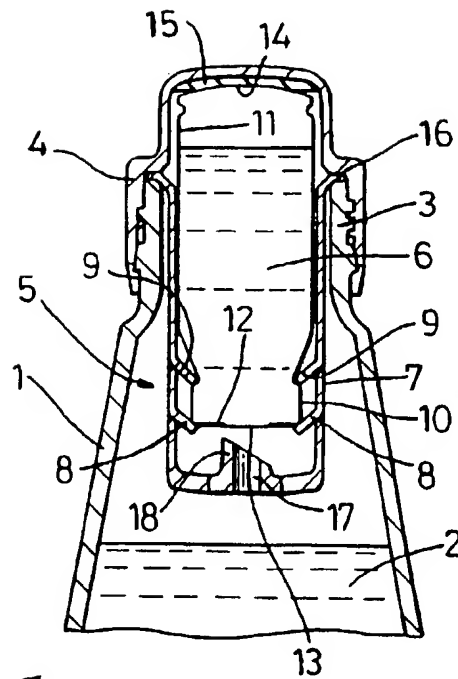


Fig. 1

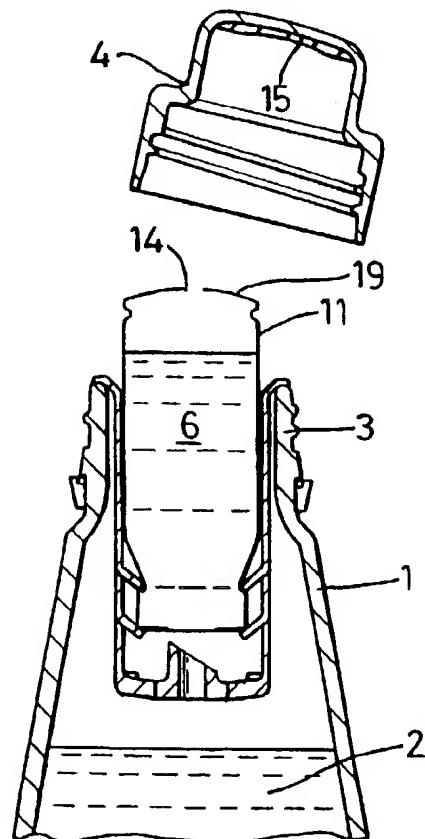


Fig. 2

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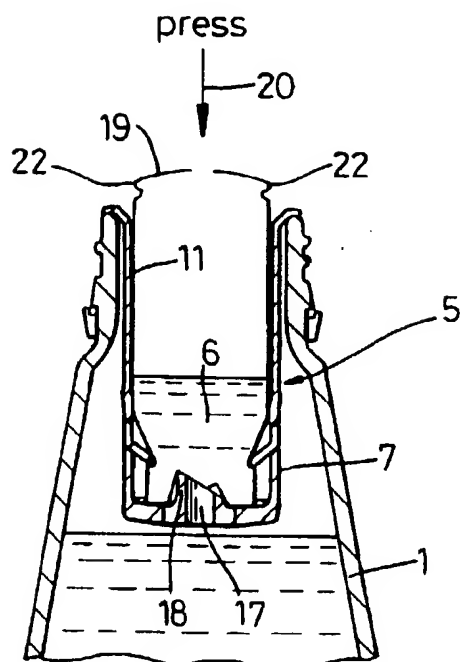


Fig. 3

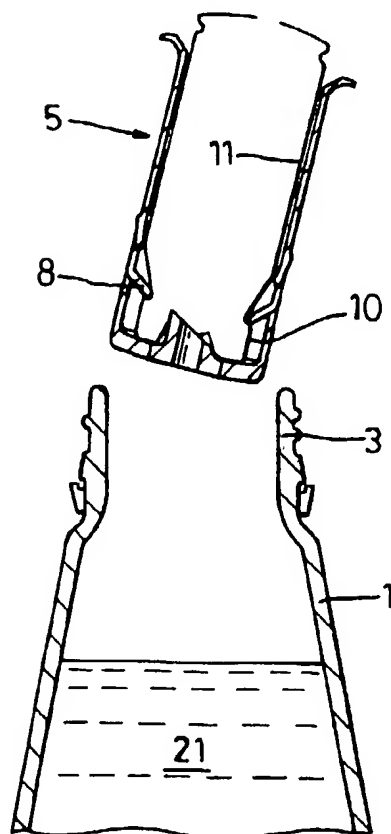


Fig. 4

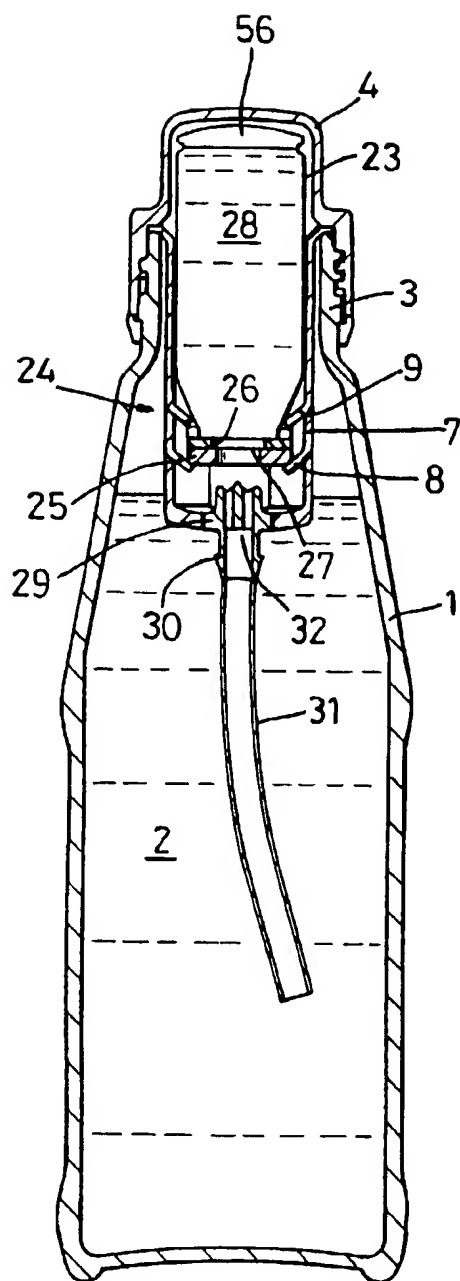


Fig. 5

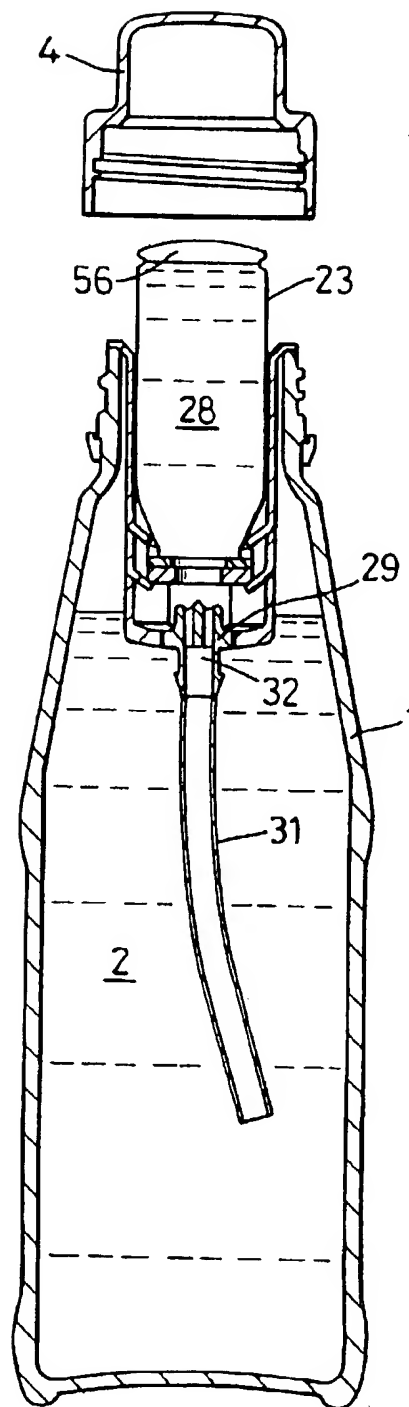
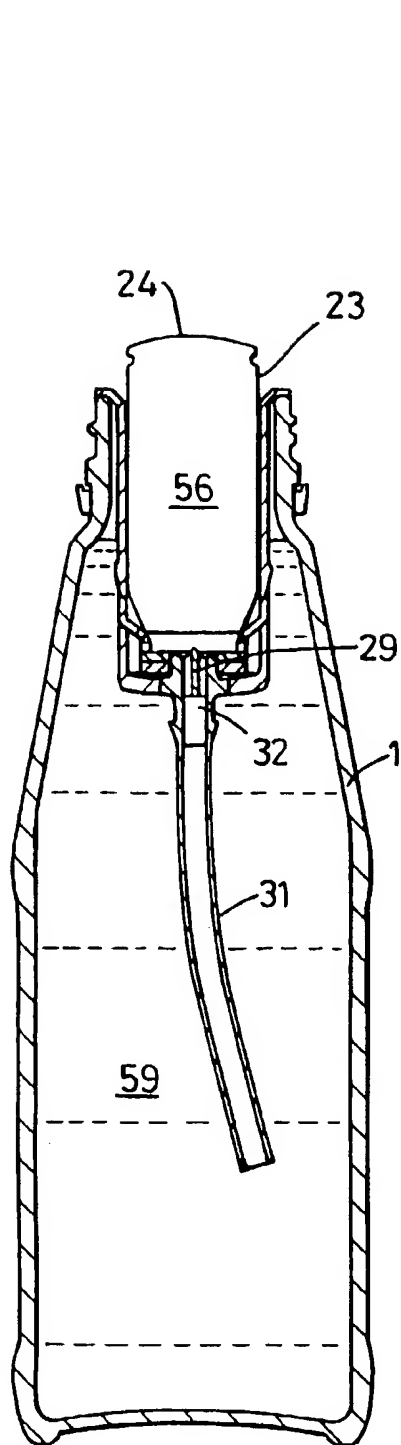
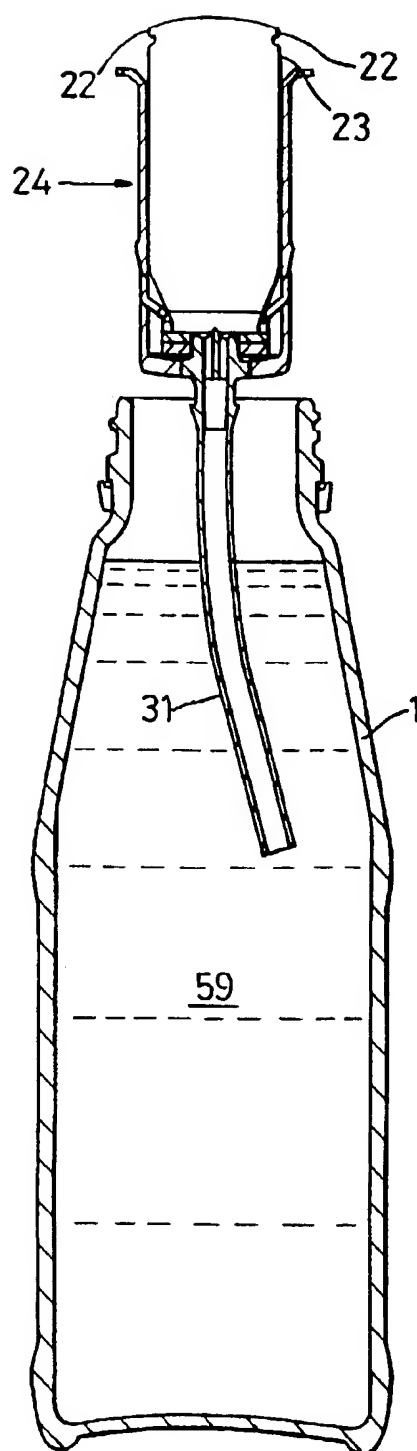
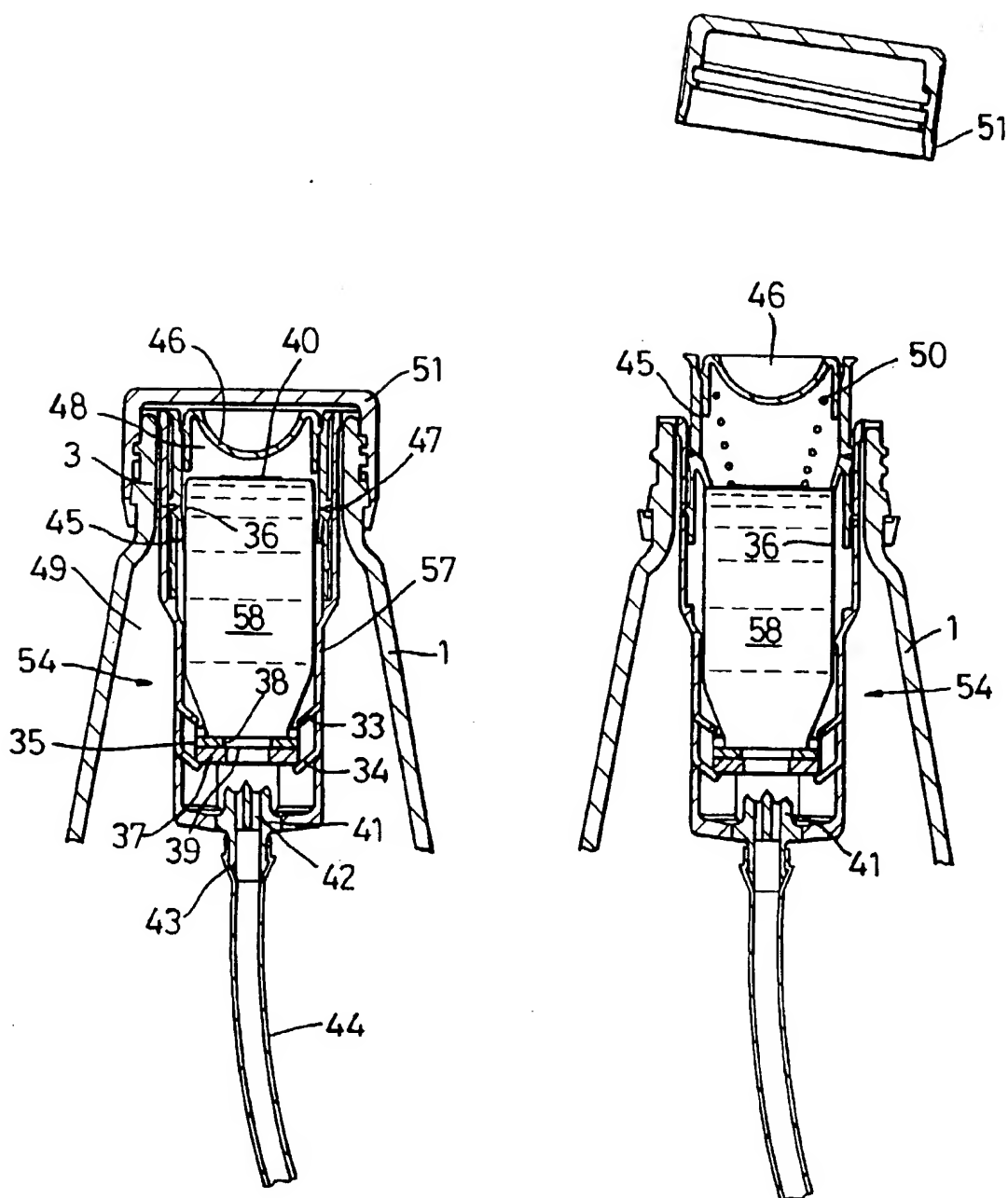


Fig. 6

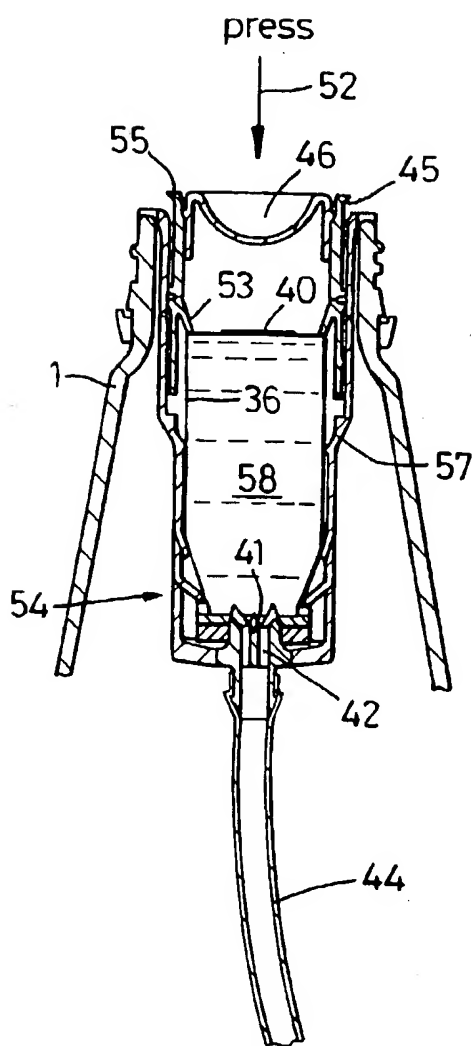
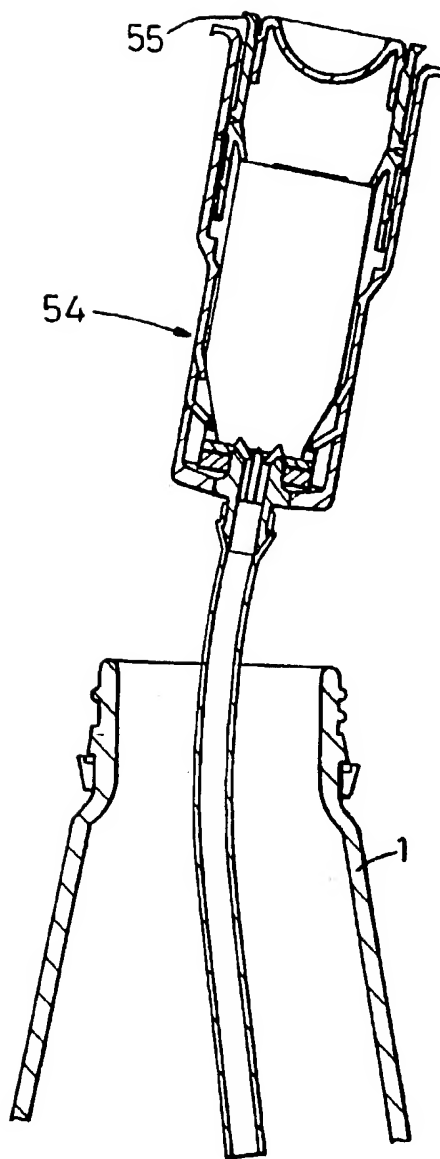
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*Fig. 7**Fig. 8*

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*Fig. 9**Fig. 10*

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*Fig. 11**Fig. 12*

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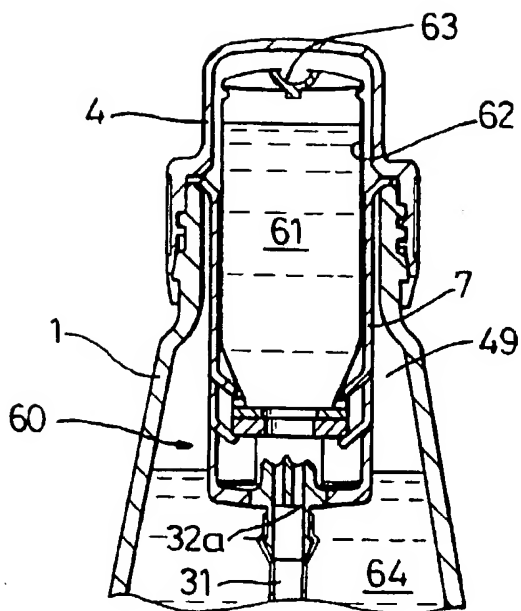


Fig. 13

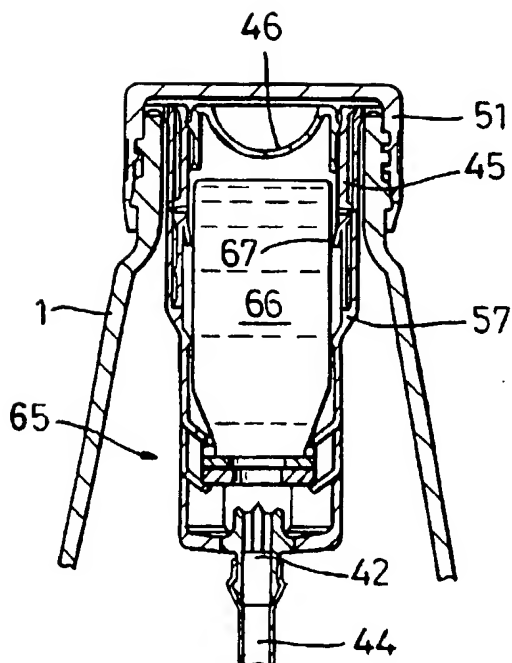


Fig. 14

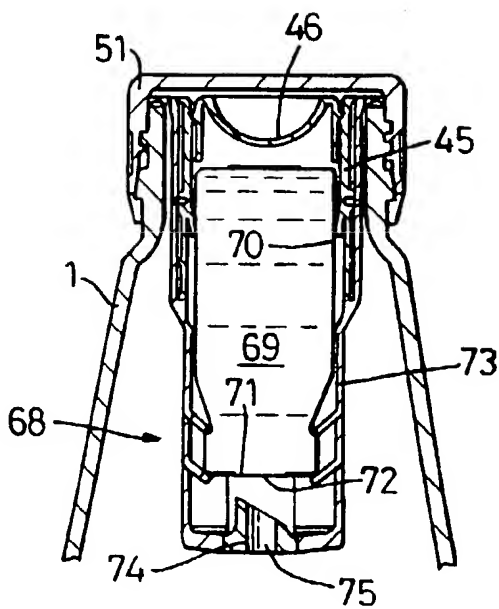


Fig. 15

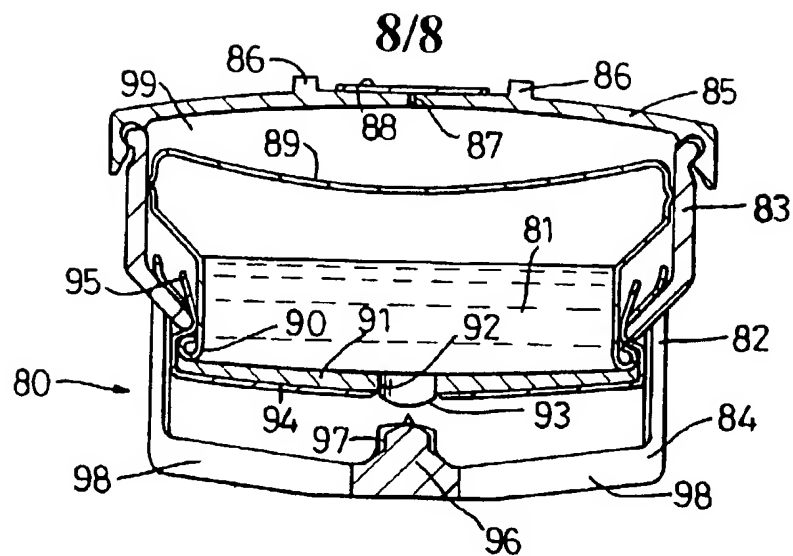


Fig. 16

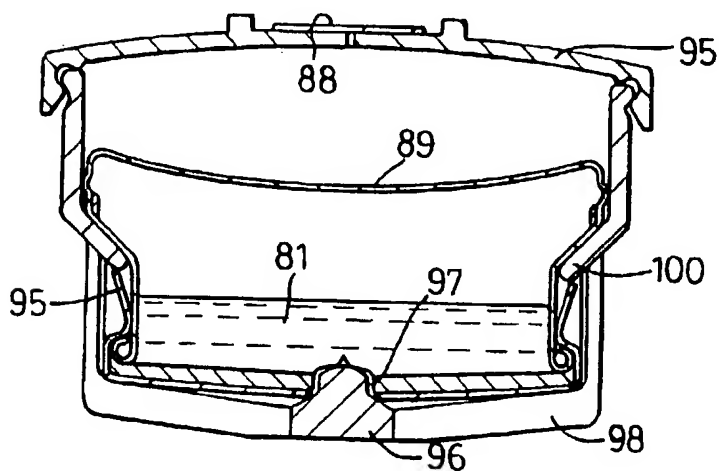


Fig. 17

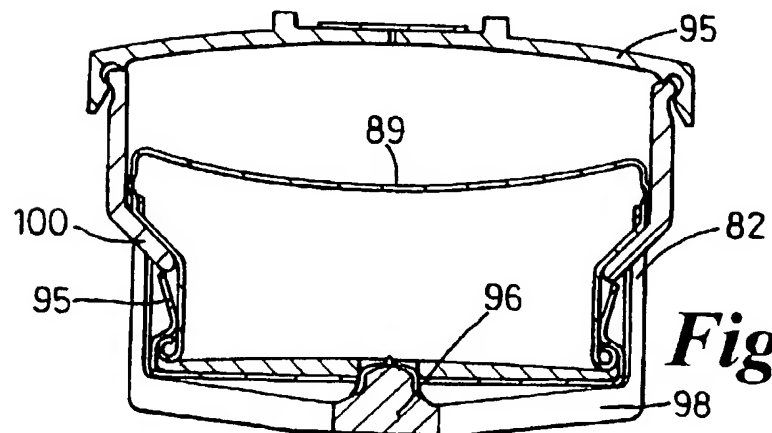


Fig. 18

INTERNATIONAL SEARCH REPORT

Intern. I Application No
PCT/GB 96/03092

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B65D51/28 B65D81/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 201 316 A (KLINGAMAN RICHARD J) 6 May 1980 see column 4, line 26 - column 5, line 12; figures 1-4 ---	1,4-7
X	DE 24 32 290 A (WUNSCH ERICH) 22 January 1976 see page 5, last paragraph - page 6, paragraph 1 ---	1,4-7
A	US 4 821 923 A (SKORKA THOMAS) 18 April 1989 see column 4, line 26 - column 5, line 32; figures --- -/--	1-8

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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- "E" earlier document but published on or after the international filing date
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

5 March 1997

Date of mailing of the international search report

20. 03. 97

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Olsson, B

INTERNATIONAL SEARCH REPORT

Inter al Application No
PCT/GB 96/03092

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 95 04689 A (SMITHKLINE BEECHAM PLC ;GILES GEOFFREY ALAN (GB)) 16 February 1995 see page 8, line 12 - page 9, line 33; figures</p> <p>-----</p>	1-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 96/03092

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DE 2432290 A	22-01-76	NONE	
US 4821923 A	18-04-89	DE 3611690 A DE 3772807 A EP 0240817 A	15-10-87 17-10-91 14-10-87
WO 9504689 A	16-02-95	EP 0711242 A	15-05-96